

collections should be kept far apart, and I doubt very much whether the State or the municipality should undertake to set out and exhibit students' collections. They interfere, in my judgment, with the two great combined objects of a "public museum," namely, first to preserve objects of permanent interest and value, especially those of the locality; and, secondly, to excite in the general public—the ratepayers who pay for the whole affair—a pleasurable and intelligent interest in the purposes of the museum by the exhibition of a limited number of fine specimens, not crowded together, but well set out and beautifully housed and cared for.

Nothing is so hostile to the true spirit and purpose of a public museum as to exhibit in it dirty, ill-mounted, mean and contemptible specimens. Next to this, nothing is so bad for a public museum as to crowd specimens in the cases, so that none produces its due effect. After this, in order of harmfulness, come illegible and careless labelling and bad classification. Local museums suffer from want of funds to pay for good cases and good setting out of specimens, and for the printing of good labels. Still more, perhaps, do they suffer for want of funds to pay for the intelligent services of a curator. But in regard to this, I believe that when there is a great deal of voluntary service and personal help given in a town, with the object of making the museum a worthy show of which the town can be proud, there need not be much difficulty in paying the salary of a curator. I must, however, tell you that he ought not to have other work to do, if you wish him to keep your museum in a state of efficiency and beauty.

Perhaps one of the greatest difficulties which local museums suffer from is the ill-considered generosity of local collectors. I know of several museums which are rendered more or less ridiculous by the worthless collections of ill-stuffed birds or other such objects, presented and, I regret to say, accepted by well-meaning committees or trustees. No collection should ever be accepted with conditions attached to it unless money is also given for carrying out those conditions, and, as a rule, no collection whatever should be accepted *en bloc* from a private donor. The friends or relatives of a deceased collector very often seem to think that a public museum is a place where rubbish may be shot. This should not be allowed. The managers of a museum, with the advice of their curator, should have definite purpose and intention, and should know what they want and try to obtain it by gift or purchase. But they should not allow themselves to be the instruments of vanity or sentiment, and should never allow their museum to become a receptacle for rubbish, no matter by whom it is offered.

If I might venture to apply some of these remarks to the Ipswich Museum, I should say the Museum ought first of all to provide an absolutely safe repository for objects of antiquity found in the neighbourhood, extending from flint implements and Roman pots to old china, brass-work and wood-carving; also for the skins of rare birds and mammals taken in Suffolk, and for the fossils of the wonderful Red Crag, which is unique as a geological phenomenon in England. Such things should be cared for, labelled, and preserved with the greatest care. The best of these things should be exhibited in the best possible cases, with ample space, and in your best rooms, fully labelled and explained. It forms *the* local collection. But besides these, and as illustrating them and the sciences with which they are connected, you should have as many really fine examples of birds and mammals, of fishes, shells, starfish and corals as your space and your funds allow you to show in a really beautiful and attractive way. These also should be fully labelled and explained. That is a *sine qua non*. They should comprise such things as the skeleton of the horse and the man, side by side; of the lion and the cat; and a few other perfect and well-chosen examples of the skeletons of animals. Then you should have the whole or parts of recent elephants to illustrate the Mastodon of the Crag and the Mammoth of the river-bed of the Orwell. The skeleton of the recent bull should be compared with the extinct ones whose bones are dug up in the local gravels. Then a glimpse should be given of some of the utterly strange extinct monsters whose skeletons are preserved in larger museums, from which you can obtain complete casts, scarcely distinguishable from the original specimens.

I do not think there is any advantage in setting out on perches in the glare of daylight, which soon destroys their colour, a complete set of British birds. If you have these and their eggs, they should, excepting a few of the more striking, be unmounted and kept in drawers.

In such a Museum as this, plants, of course, will not be neglected. A herbarium can readily be formed and kept for reference and record. But for your exhibition cases there are many most interesting features concerning the seedlings, early and later growth, and changes of our native trees, which form most striking and instructive exhibits. In an agricultural county a set of models illustrating the life-history of wheat, such as has lately been set up in the Natural History Museum, would be greatly appreciated. Further, let me say that there is a no more beautiful and interesting class of objects for a public museum than really fine crystals and minerals of various kinds. The history of agates, and of the carnelians and other pebbles from the Felixstowe beach would form a delightful and most attractive case in the Ipswich Museum. But in no instance should there be a mean or dirty or ill-considered specimen in any one of your glass cases.

I think that the whole of one of the larger rooms in such a museum should be kept shut up and used for placing cabinets and for storing those specimens in glass cases with which it is not desirable to try the patience of the general public. They should be accessible on proper application; but why show all your doubtful specimens, your obscure though important fragments, your faded skins of birds and mammals to the public? It is not always right to destroy unsightly specimens, but it is never right to offend and disappoint the innocent visitor to a museum by thrusting them under his eyes. He wishes to be pleased, to learn something—not too much—but still something of natural history. You may lead him on by judicious exhibition to enthusiasm and serious interest in science: then he will be able to tolerate the sight of your sick specimens, but you gain a bad reputation for museums if you let your visitor be disgusted at the very first by incongruity and neglect.

A county museum is not a place for children or school-teaching: it is not Noah's Ark or Madame Tussaud's waxworks, but a place for the delight of grown-up men and women. It should be full of the things which are the pride of those who care for the history and natural life of their countryside, and just as you do not use a picture gallery to teach the elements of drawing, but for the enjoyment of fine pictures, so your county museum must be for the enjoyment by your grown-up, educated people of the rarities of nature and of art, and not for the cramming of schoolboys and schoolgirls.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The curators of the University chest have been authorised to spend 1050*l.* in erecting a new chemical laboratory over some of the existing rooms.

Prof. E. B. Tylor delivered a public lecture on November 22 upon totems and totemism, with special reference to the magnificent totem-post from British Columbia which he has recently presented to the Pitt-Rivers Museum.

Brasenose College has elected the keeper of the Ashmolean Museum to an *ex-officio* fellowship, which will have the effect of increasing his stipend by 100*l.* a year and augmenting the income of the Ashmolean Museum and the University Galleries by the same sum.

The 229th meeting of the Junior Scientific Club was held on November 20; a paper was read by Dr. Collier on "Health and Athletics," and Mr. A. T. V. Sidgwick read a paper on "Acetone Di-propionic Acid."

MR. E. H. GRIFFITHS, F.R.S., Fellow of the Sidney Sussex College, Cambridge, has been appointed Principal of the University College of South Wales and Monmouthshire in succession to the late Mr. Viriamu Jones.

THE first number of the *London University Gazette* has appeared, and is largely taken up with a statement of the constitution of the reorganised University and the conditions under which the work is now being carried on. The text is given of an address sent to Prof. Virchow on his eightieth birthday, and of one to Yale University upon the occasion of the recent bicentennial celebrations.

A COMMENDABLE characteristic of the Calendar of University College, London, is the list of original papers contributed by members of the scientific departments of the College to various

societies and publications. The list contains nearly one hundred papers as the record of activity during the College year 1900-1901, and it is a better testimony to the work carried on than many successes at examinations. A similar statement of investigations made in the laboratories of the Royal College of Science and the Solar Physics Observatory during the session 1899-1900 will be found in the recently-published report of the Board of Education, vol. iii.

SCIENTIFIC SERIAL.

American Journal of Science, November.—On the effect of temperature and moisture on the emanation of phosphorus, and on a distinction in the behaviour of nuclei and of ions, by C. Barus.—On the determination of the heat of dissociation and combustion of acetylene, ethylene and methane, by W. G. Mixer. Acetylene was exploded alone and with oxygen and the amount of heat evolved measured. If acetylene is exploded without oxygen in presence of a small quantity of ethylene, the latter is completely decomposed, and in this way the heat of dissociation can be more accurately determined than by the usual combustion method.—The geological relations and the age of the St. Joseph and Potosi limestones of St. Francois County, Missouri, by F. S. Nason.—Note on the Cambrian fossils of the Francois County, Missouri, by C. E. Beecher. From the fossils found an extensive area and thickness of sedimentary rocks are definitely placed in the Cambrian. Palæontological evidence as to the nature of these rocks had hitherto been largely wanting.—Discovery of Eurypterid remains in the Cambrian of Missouri, by C. E. Beecher. Description and drawing of *Strabops Thacheri*.—The determination of persulphates, by C. A. Peters and S. E. Moody. An experimental examination of the methods proposed by Mondolpo, Namias, Le Blanc and Eckhardt, Grutzner and the author. The process of Le Blanc and Eckhardt, the oxidation of ammonio-ferrous sulphate in sulphuric acid solution, is recommended as being simple, rapid and convenient.—Studies of Eocene mammalia in the Marsh collection, Peabody Museum, by J. L. Wortman. A continuation of previous papers on the same subject.—The Carboniferous and Permian age of the red beds of Eastern Oklahoma from stratigraphic evidence, by G. I. Adam.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, November 22.—Prof. S. P. Thompson, president, in the chair.—Prof. W. Cassie read a paper on multiple transmission fixed arm spectroscopes. The simplest form of spectroscope shown consisted of two half prisms silvered on the back, between which a beam of light goes backwards and forwards with a slight upward inclination. The result in dispersing and resolving power is equivalent to direct transmission through a long train of prisms. The collimator and observing telescope are fixed and adjustment is made by a double tangent screw which moves both the prisms. Two other types constructed on a similar principle were described, of which one had one prism and two speculum mirrors, and the other had two refracting prisms and a reflecting right-angled prism. The adjustments of these instruments are simple and their power great. By a small movement of an adjusting screw the observer can produce great changes of dispersion by passing from one to another of the series of spectra which are produced. The author in reply to questions said that with an ordinary Bunsen burner sodium flame a series of about five spectra is easily observed with dispersion equivalent to direct transmission through ten full-sized prisms. The loss of light at the reflections limits the number of transmissions that can be used; but he believed that no other spectroscope with only two prisms would give dispersing power and resolving power in any way approaching the instrument described.—Prof. W. Cassie then read a paper on the measurement of Young's modulus. The apparatus described consisted of a horizontal needle (a bar of large moment of inertia) supported by a bifilar suspension made of the wire of which the stretch modulus is to be measured. The periods of the pitching, rolling and bifilar oscillations of this system are observed, and an expression for the stretch modulus is obtained which involves no measurements except the

weight of the needle and the periods of oscillations. The necessary adjustments, and the means of eliminating residual errors of adjustment, were described for two forms of the apparatus. One form also affords a simple means of statical measurement by hanging a small weight on the needle at measured distances from the centre, calculating the difference of tension produced in the wires, and observing with a mirror and scale the consequent dip of the needle.—A paper entitled "Notes on Gas-Thermometry, Part ii," by Dr. P. Chappuis, was read by Dr. Harker. Messrs. Holborn and Day have published recently in a research on the air thermometer the results of a new determination of the expansion of Berlin porcelain between 0° and 1000°. The author has already drawn attention in a former note to the fact that part of the divergence found between the results of Callendar and Griffiths and of Harker and himself for the boiling-point of sulphur may be attributed to the uncertainty in the values assumed for the expansion of porcelain. In the present paper the author examines the way in which their results would be modified by the introduction of the dilatation deduced from the experiments of Messrs. Holborn and Day. It follows from the introduction of the new values that the boiling-point of sulphur deduced from experiments with a porcelain reservoir thermometer would be lowered from 445°·2 to 444°·7, a number very close to that obtained by Callendar and Griffiths. In a second part of the paper Dr. Chappuis has recalculated the divergences between the uncorrected nitrogen scale and the theoretical scale, and finds that the difference between these values and those given previously is too small to be of any practical importance. Prof. H. L. Callendar said that he was highly gratified to see that the application of the correction for the expansion of the bulb of Dr. Chappuis' gas-thermometer, deduced from Holborn and Day's results, gave a value, 444°·7, for the boiling-point of sulphur in such close agreement with the value 444°·5 deduced by Mr. Griffiths and himself in 1890. The agreement was really much closer than appeared at first sight, because the remaining difference of two-tenths of a degree in the results was almost exactly accounted for by the scale difference of the constant pressure and constant volume thermometers according to the theory of Joule and Thomson. It was also interesting to remark that the corrected result found by Dr. Chappuis was in very close agreement with that deduced from their own observations by Messrs. Holborn and Day. Dr. Chappuis had not referred in the present note to the work of Bedford on the expansion of Bayeux porcelain, which he had criticised in a previous paper. A comparison of results would show that Bedford's results agreed very fairly, allowing for the difference of material, with Holborn and Day's from 200° to 600° C.; and that both differed from those of Dr. Chappuis between 0° and 80°, when extrapolated, in a precisely similar manner. It was quite possible, as he (Prof. Callendar) had previously suggested, that the expansion of porcelain between 0° and 100° was anomalous. It appeared certain that some anomaly in the expansion at 800° was indicated both in the experiments of Bedford and also in those of Holborn and Day. It was also clear that Dr. Chappuis' results for Bayeux porcelain when extrapolated would agree with Bedford's at a temperature a little above 100° C., or very nearly at the same point at which his results for Berlin porcelain agreed with those of Holborn and Day.

Mathematical Society, November 14.—Dr. Hobson, F.R.S., president, in the chair.—After the ballot had been taken the president announced that the gentlemen whose names were published in NATURE (October 17) were duly elected for the current session. Dr. J. Larmor, F.R.S., propounded a query regarding the recent behaviour of Nova Persei which gave rise to remarks by the president, Dr. Glaisher, F.R.S., and Messrs. Hargreaves, Hough and Lieut.-Colonel Cunningham, R.E.—Prof. Love, F.R.S., communicated two papers by Mr. J. H. Michell, (1) on the inversion of plane stress, and (2) on the theory of Hele-Shaw's experiments on fluid motion, dwelling specially on the latter paper, which also evoked some discussion.—Mr. E. T. Whittaker read a paper on the solution of dynamical problems in terms of trigonometrical series. The president spoke at some length upon the subject and other members joined in a discussion.—The following papers were communicated by the reading of their titles:—Linear groups in an infinite field, Dr. L. E. Dickson; note on the algebraic properties of Pfaffians, Mr. J. Brill; on Burmann's theorem, Prof. A. C. Dixon; the Puiseux diagram and differential equations, Mr. R. W. H. T.